OVERHEAD DOOR SHADE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is related to applicant's prior U.S. Provisional Application No. 60/393,993, filed July 3, 2002, entitled "Overhead Door Shade System", the contents of which are hereby herein incorporated by reference and are not admitted to be prior art with respect to the present invention by their mention in this cross-reference section.

BACKGROUND

This invention relates to providing a system for improved shading of the interior of a building. More specifically, this invention relates to a shade system for use within a door opening of a building where the door opening comprises at least one overhead access door, such as a vehicular garage door or rolling service door.

Frequently, residential and commercial building designs include the provision for one or more vehicular access doors. Well-known examples of vehicular access doors include residential overhead garage doors for private motor vehicles, and rolling service doors used in the shipping and receiving operations of commercial warehouses. A common characteristic of most vehicular access doors is that of relatively large size. A minimum opening width for a single car access door is about eight feet, while multiple vehicular openings may range in width from slightly less

than twenty feet, to well over fifty feet. Often, the solar orientations of these relatively large openings are not ideal, allowing an undesirable amount of sunlight to enter the interior of the building. In many instances, due to operational requirements or convenience, it is highly desirable for the overhead door to remain in an open position for a protracted period.

It has been demonstrated that each unprotected square foot of sunlit interior surface can generate up to 230 BTUs of heat. Interior spaces without the benefit of solar control can quickly become intolerably uncomfortable for the occupants of the space due to solar heat gain and glare. Frequently, the interior space of a building served by a vehicular door is occupied by one or more persons for extended periods. For example, residential garages often serve as workshop or hobby spaces, and commercial loading docks are often staffed continuously during daylight hours. Energy costs to comfortably condition a space without solar control is consistently higher than similar spaces equipped with solar control systems. Many materials are susceptible to damage by prolonged exposure to sunlight (e.g., damage often referred to as "sun-rot"). Additionally, an increasing number of public health organizations have expressed concerns about prolonged human exposure to the ultra violet rays contained in sunlight. It is clear that a need exists for an improved system

for controlling the entry of sunlight through large overhead doors. A system of shading that is quickly deployed by the occupant/user of the system, which system does not hinder the operation of the overhead door, would be of benefit to many.

OBJECTS OF THE INVENTION

A primary object and feature of the present invention is to provide a system for shading the interior of a building from sunlight passing through an open overhead access door.

It is a further object and feature of the present invention to provide such a system that is mounted to the overhead access door, allowing for full functionality of the door without removal of the system.

It is an additional object and feature of the present invention to provide such a system that is compactly storable while remaining mounted to the door.

It is an additional object and feature of the present invention to provide such a system allowing convenient user passage through the system while the system is in use.

A further primary object and feature of the present invention is to provide such a system that is efficient, inexpensive and handy. Other objects and features of this invention will become apparent with reference to the following descriptions.

SUMMARY OF THE INVENTION

In accordance with a preferred embodiment hereof, this invention provides a shading system for shading at least one interior portion of a building from sunlight entering through at least one building opening serving at least one overhead-type access door, comprising in combination at least one blocker structured and arranged to block sunlight passing through at least one portion of the at least one building opening; at least one attacher structured and arranged to firmly attach such at least one blocker to at least one interior portion of the at least one overhead-type access door; and at least one stower structured and arranged to stow at least one portion of such at least one blocker on the interior portion of the at least one overhead-type access door when such at least one blocker is not in full use.

Additionally, it provides such a system wherein such at least one blocker comprises: at least one flexible fabric; wherein such at least one flexible fabric is structured and arranged to pass a controlled quantity of sunlight. Further, it provides such a system wherein such at least one blocker comprises: at least one tensioner structured and arranged to tension such at least one flexible fabric. Moreover, it provides such a system wherein such at least one tensioner comprises: at least one horizontal bottom bar. Additionally, it provides such a system wherein such at least one stower comprises at least one

securer structured and arranged to removably secure at least one portion of such at least one blocker to at least one interior portion of the at least one overhead-type access door. Further, it provides such a system wherein such at least one securer comprises: at least one elastic cord having at least one hook.

Furthermore, it provides such a system wherein such at least one stower comprises: at least one rolling lifter structured and arranged to lift such at least one blocker from an unrolled position to a rolled position; and at least one retainer structured and arranged to retain such at least one blocker in at least one rolled position, at least one unrolled position and at least one intermediate rolled position. Additionally, it provides such a system wherein such at least one rolling lifter comprises: at least one rolling support tube; and at least one spring tensioner; wherein such at least one spring tensioner is structured and arranged to generate a winding force within such at least one roller tube as such at least one blocker is lowered to the unrolled position.

Moreover, it provides such a system wherein such at least one attacher comprises at least one support bracket mechanically fastened to the at least one overhead-type access door. Additionally, it provides such a system wherein such at least one blocker comprises at least one movement resister structured and arranged to resist movement of at least one portion of such at

least one blocker when such at least one blocker is in an unstowed position. In addition, it provides such a system wherein such at least one movement resister comprises: at least one friction retainer structured and arranged to retain such at least one blocker in an essentially fixed position.

Additionally, it provides such a system wherein such at least one movement resister comprises at least one hook-and-loop retainer structured and arranged to retain such at least one blocker in an essentially fixed position. Further, it provides such a system wherein such at least one movement resister comprises at least magnetic retainer structured and arranged to magnetically retain such at least one blocker in an essentially fixed position. Even further, it provides such a system wherein such at least one blocker comprises at least one wind load reliever structured and arranged to relieve a wind load force acting on at least one surface portion of such at least one blocker. Additionally, it provides such a system wherein such at least one blocker comprises: at least one opener structured and arranged to open at least one access portal through such at least one blocker; and at least one access blocker structured and arranged to block access through such at least one access portal. Additionally, it provides such a system wherein such at least one access blocker comprises at least one zipper. Moreover, it provides such a system wherein such at least one access blocker

comprises: at least one hook-and-loop fastener.

Additionally, in accordance with a preferred embodiment hereof, this invention provides a shading system for shading at least one interior portion of a building from sunlight entering through at least one building opening serving at least one overhead-type access door, comprising in combination at least one overhead- type access door; at least one blocker structured and arranged to block sunlight passing through at least one portion of the at least one building opening; at least one attacher structured and arranged to firmly attach such at least one blocker to at least one interior portion of such at least one overhead-type access door; and at least one stower structured and arranged to stow at least one portion of such at least one blocker on the interior portion of such at least one overhead-type access door when such at least one blocker is not in full use.

Additionally, it provides such a system wherein such at least one attacher comprises at least one support bracket mechanically fastened to the at least one overhead-type access door. Furthermore, it provides a system wherein such at least one attacher comprises at least one support bracket integrally formed with such at least one overhead-type access door.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the overhead door shade

system mounted to an overhead door, shown shading the interior of a building structure according to a preferred embodiment of the present invention.

FIG. 2 is an interior elevational view of the overhead door shade system of FIG. 1.

FIG. 3 is a section view through the section 3-3 of FIG. 1.

FIG. 4 is a perspective view, partially in section, of Detail 4 of FIG. 2.

FIG. 5 is a view through the section 5-5 of FIG. 4.

FIG. 6 is a view through the section 6-6 of FIG. 4

FIG. 7 is a perspective view, partially in section, of a preferred bottom retainer of the overhead door shade system.

FIG. 8 is a perspective view, partially in section, of another preferred bottom retainer of the overhead door shade system.

FIG. 9 is a perspective view, partially in section, of yet another bottom retainer of the overhead door shade system.

FIG. 10 is a perspective view, partially in section, of an alternate preferred embodiment of the overhead door shade system shown fully extended and mounted to an overhead door.

FIG. 11 is a perspective view, partially in section, of the overhead door shade system of FIG. 10 shown mounted to an overhead door, in a stored position.

FIG. 12 is a perspective view of the overhead door shade

system shown mounted to a rolling overhead door, illustrating an alternate preferred installation according to another preferred embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

FIG. 1 is a perspective view of an overhead door shade system **100** mounted to an open overhead door **102**, shown shading the interior of a building structure **104** from sunlight **112** entering through a door opening **110**, according to a preferred embodiment of the present invention. Preferably, overhead door shade system **100** comprises a flexible screen panel **106** (embodying herein at least one blocker structured and arranged to block sunlight passing through at least one portion of the at least one building opening) that is mounted to the lower interior face **108** of overhead door **102**, as shown. When overhead door **102** is in an open position, overhead door shade system **100** may preferably be lowered to protect all or part of door opening **110**, as shown. It should be noted that "open", in reference to the present invention, included all positions of a door between a closed position and a fully opened position. Overhead door shade system **100** preferably includes semi-circular, wind-relieving slits **114** (embodying herein at least one wind load reliever structured and arranged to relieve a wind load force acting on at least one surface portion of such at least one blocker) and a passage door

116, as shown. The preferred passage door **116** (embodying herein at least one opener structured and arranged to open at least one access portal through such at least one blocker; and at least one access blocker structured and arranged to block access through such at least one access portal) provides convenient access through screen panel **106** of overhead door shade system **100** without raising or storing the system, as shown. Preferably, passage door **116** comprises an essentially rectangular "C"-shaped slit having a continuous zipper **117** sewn to the perimeter edge, as shown. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, consider such issues as intended use, non-wind locations, manufacturing and design efficiency, marketability studies, etc., other sealing methods to retain the passage door, such as hook-and-loop fasteners, gravity, ties, etc., may suffice. Also, upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, consider such issues as intended use, user preference, manufacturing and design efficiency, marketability studies, etc., other passage door shapes, such as oval, curved, etc., may suffice. FIG. 2 is an interior elevational view of the overhead door shade system **100** of FIG. 1 mounted to a closed overhead door **102**. FIG. 2 shows the interior face of overhead door **102** (as viewed from the

building interior). In the preferred embodiment shown in FIG. 2, the configuration of overhead door **102** is typical of a type of residential garage door having a series of essentially rectangular-hinged panels **118** that are retained by end track(s) **120**, as shown. The overhead door **102** is preferably designed such that the end track(s) **120** are permanently mounted to an interior wall **122** of the building structure **104**, as shown. Hinged panels **118** forming overhead door **102** are preferably free to move up and down within the fixed end track(s) **120** when overhead door **102** is opened and closed. Preferably, overhead door shade system **100** is mounted to the lower portion of bottom panel **124**, as shown. Preferably, no portion of overhead door shade system **100** is mounted between a fixed and an operable portion of the overhead door **102**, allowing the door to remain operational while overhead door shade system **100** is attached. Therefore, overhead door shade system **100** may preferably be installed on overhead door **102** in a permanent manner, as shown. Preferably, overhead door shade system **100** provides a manually operated roll-up lifting feature that allows the screen panel **106** to be rolled-up and retained in a compact stored roll **126** when not in use, as shown. Those with ordinary skill in the art, upon reading the teachings of this specification, will now appreciate that, under appropriate circumstances, considering issues such as economic

considerations, user preferences, etc., other methods of operating the overhead door shade system **100**, such as automatic, timed, wireless operation etc., may suffice.

FIG. 3 is a view through the section 3-3 of FIG. 1, showing overhead door shade system **100** mounted to overhead door **102**. Adjusting overhead door **102** to any open position allows overhead door shade system **100** to be extended to provide shade protection to building interior **128** of building structure **104**, as shown. FIG. 3 illustrates overhead door **102** in a fully open position with the screen panel **106** unrolled to a fully lowered position. Preferably, screen panel **106** is essentially rectangular, having a preferred maximum width equaling the width of overhead door **102**, and a maximum height preferably matching the height of door opening **110**. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as accommodating specific mounting applications, etc., other shapes and sizes of the screen panel may suffice.

Preferably, screen panel **106** is formed from a single fabric panel. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances such as to accommodate especially wide door openings, create areas of varying shade density or to provide a variety of colors, etc., other screen panel

configurations such as two or more fabric panels joined edge-to-edge, etc., may suffice. Screen panel **106** preferably comprises a UV-resistant vinyl-covered polyester material, such as "Suntex"™ shade fabric (as produced by Phifer Wire Products, Inc. of Tuscaloosa, Alabama, USA). Preferably, the fabric of screen panel **106** may be selected from a group of fabrics having a range of shade factors (defined as the amount of open light admitting area versus the closed or opaque area of the fabric) matching the shading requirements of a specific installation (embodying herein at least one flexible fabric; wherein such at least one flexible fabric is structured and arranged to pass a controlled quantity of sunlight). Typical screen panel materials may pass 10% to 50% of the sunlight falling on the fabric surface. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as intended use, outward visibility requirements, privacy requirements, air-flow, etc., other shading materials providing sunlight filtering, reduced glare, better outward visibility, daytime privacy and passage of air, etc., may suffice. Other preferable shade screen materials include knitted polyethylene and PVC-coated fiberglass fabrics. Preferably, the edges of screen panel **106** are finished in a matching bias tape. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under

appropriate circumstances, considering such issues as user preference, marketability studies, manufacturing and design requirements, etc., other finishes for the edge of screen panel **106**, such as an unfinished edge or an edge finished with a folded and sewn "hemmed edge," etc., may suffice.

It should be noted that overhead door shade system **100** may, under appropriate circumstances, be mounted in a number of positions on overhead door **102**. For example, overhead door shade system **100** may be mounted to end tracks **120** in alternate position **121**, as shown.

FIG. 4 is a perspective view, partially in section, of Detail 4 of FIG. 2. FIG. 4 shows the overhead door shade system **100** mounted to overhead door **102**. Overhead door shade system **100** is preferably mounted to overhead door **102** using end support bracket **130** (embodying herein at least one attacher structured and arranged to firmly attach such at least one blocker to at least one interior portion of the at least one overhead-type access door and embodying herein at least one support bracket mechanically fastened to the at least one overhead-type access door), as shown. Preferably, end support bracket **130** is formed from a rigid material, preferably metal, most preferably steel. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as economy,

weight, manufacturing and design requirements, etc., other end support bracket materials, such as durable plastic, etc., may suffice. Preferably, end support bracket **130** is mechanically fastened to at least one interior panel-reinforcing member **132** of overhead door **102** using semi-permanent fasteners **136**, such as self-tapping screws, bolts or similar fasteners, as shown. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, end support bracket **130** may be riveted, welded, or integral to, overhead door **102** (embodying herein at least one support bracket integrally formed with such at least one overhead-type access door), as would be supplied with a factory-installed system.

Preferably, end support bracket **130** is used at each end of overhead door shade system **100**. Preferably, end support bracket **130** is designed to removably retain idler assembly **134**, part of the preferred roller lifting system **140** (embodying herein at least one stower structured and arranged to stow at least one portion of such at least one blocker on the interior portion of the at least one overhead-type access door when such at least one blocker is not in full use, and embodying herein at least one rolling lifter structured and arranged to lift such at least one blocker from at least one unrolled position to at least one rolled position) that uses the principle of the capstan to wind

up and retain screen panel **106**, as shown. Preferably, roller lifting system **140** is similar in operation to roller-shades of typical types and is preferably capable of lifting and supporting the entire weight of screen panel **106**. Roller lifting system **140** preferably comprises idler assembly **134**, preferably located at the ends of roller tube **138** (embodying herein at least one rolling support tube) to provide a rotary bearing and support function for the rotating components of overhead door shade system **100**, as shown. The upper edge of screen panel **106** is preferably supported by roller tube **138** by attachment along its length. Additionally, roller lifting system **140** preferably comprises at least one roller spring **142** (embodying herein at least one spring tensioner), preferably in the form of a long, closely wound extension spring, used to generate a counter torsional force applied to roller tube **138** as screen panel **106** is unwound (embodying herein wherein such at least one spring tensioner is structured and arranged to generate a winding force within such at least one roller tube as such at least one blocker is lowered to the unrolled position).

Further, roller lifting system **140** preferably comprises at least one clutch system (internal to idler assembly **134**) commonly comprising a series of one-way spring clutches that allow roller tube **138** to rotate when the user applies force and that prevent

rotation when the force is removed (herein embodying at least one retainer structured and arranged to retain such at least one blocker in the at least one rolled position, the at least one unrolled position and at least one intermediate rolled position). Preferably, the diameter and construction of roller tube **138** allows the assembly to be self-supporting, spanning between end support bracket(s) **130** with essentially no deflection. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as user preference, marketability studies, improvements in shade technology, design and manufacturing requirements, etc., other methods of raising and lowering the shade panel, such as chain operation, hand-rolling, etc., may suffice.

A hembar **144** is preferably used at the bottom edge of screen panel **106** to keep the fabric straight and taut, as shown. Hembar **144** (embodying herein at least one tensioner structured and arranged to tension such at least one flexible fabric, wherein such at least one tensioner comprises at least one horizontal bottom bar) is preferably of a hollow design, but under appropriate circumstances, may be, for example, solid to provide additional weight for added stability. Preferably, hembar **144** is constructed from a rigid PVC plastic having an inner diameter of about 1/2". Upon reading the teachings of this specification,

those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as weight, durability, cost, etc., other essentially rigid materials, such as metal, wood, etc., may suffice. Preferably, hembar **144** is attached to screen panel **106** by insertion into a continuous pocket within the screen panel **106**. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as user preferences, design and manufacturing requirements, etc., other hembar to shade panel fastening methods, such as adhesive attachment, mechanical fastening, etc., may suffice. Also, upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as user preferences, marketability studies, etc., other sizes, styles and shapes of hembar, such as extending the ends of hembar **144** beyond the width of screen panel **106** to engage bottom retainer **146** (as shown), etc., may suffice.

FIG. 5 is a view through the section 5-5 of FIG. 4, showing overhead door shade system **100** mounted to overhead door **102**. Preferably, bottom retainer **146** (embodying herein at least one movement resister structured and arranged to resist movement of at least one portion of such at least one blocker when such at least one blocker is in an unstowed position) functions to

receive and removably retain the end of hembar **144**. Bottom retainer **146** is preferably designed such that hembar **144** is retained against most wind loads, but is automatically released by a strong upward movement of the hembar **144**, either by the user, or by operation of the overhead door. In the preferred embodiment of FIG. 5, bottom retainer **146** comprises a "U"-shaped friction retaining socket adjustably mounted to the fixed end tracks **120** of overhead door **102**, as shown. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as user preferences, design and manufacturing requirements, marketability studies, etc., other bottom retaining arrangements such as shown in FIG. 7, FIG. 8 and FIG. 9, etc., may suffice.

FIG. 6 is a view through the section 6-6 of FIG. 4, showing overhead door shade system **100** mounted on a closed overhead door **102**. Preferably, end support bracket **130** is configured to position the moving portions of overhead door shade system **100** clear of all fixed components of overhead door **102**, as shown. Illustrated in the sectional view of FIG. 6, is the interior of stored roll **126** comprising screen panel **106** wound around roller tube **138**. In preferred operation, overhead door **102** is raised to an open position, allowing a user to grasp hembar **144** (or a cord

attached to the hembar **144**) and draw the screen panel **106** down over the door opening **110** in order to engage the bottom retainer **146**. Preferably, overhead door shade system **100** is returned to a stored position by disengaging the hembar **144** from the bottom retainer **146** followed by releasing the clutch of the roller lifting system **140** in order to allow the screen panel **106** to return to a rolled position around the roller tube **138**.

FIG. 7 is a partial perspective view of a preferred bottom retainer **146** (embodying herein at least one friction retainer structured and arranged to retain such at least one blocker in an essentially fixed position) of the illustrated overhead door shade system **100**. Preferably, bottom retainer **146** retains hembar **144** using friction.

FIG. 8 is a perspective view, partially in section, of another preferred bottom retainer **145** of the overhead door shade system **100**. Preferably, bottom retainer **145** comprises a magnetic end cap **148** attached to hembar **144**, and at least one corresponding magnet-attracting-plate **150** mounted to a fixed structure, such as the floor **156**, as shown. Bringing magnetic end cap **148** and corresponding magnet-attracting-plate **150** together creates a releasable bond that holds hembar **144** and screen panel **106** in an essentially fixed position (embodying herein at least one magnetic retainer structured and arranged to

magnetically retain such at least one blocker in an essentially fixed position).

FIG. 9 is a perspective view, partially in section, of yet another bottom retainer 147 of the overhead door shade system 100. Preferably, bottom retainer **147** comprises an end cap **152** (preferably a hook-and-loop arrangement, as shown) attached to hembar **144** and corresponding plate **154** mounted to a fixed structure, such as the floor **156** (embodying herein at least one hook-and-loop retainer structured and arranged to retain such at least one blocker in an essentially fixed position), as shown.

FIG. 10 is a perspective view, partially in section, of an alternate preferred embodiment of the overhead door shade system **200** shown fully extended and mounted to an overhead door **102**.

FIG. 10 shows overhead door shade system **200** mounted to overhead door **102**, shading the interior of building structure **104**. Preferably, the upper edge **158** of the overhead door shade system **200** is fastened directly to the bottom panel **124** of the overhead door **102** (without the use of a roller lifting system, as utilized by overhead door shade system **100**). The preferred sizing and fabric materials of screen panel **106** are essentially identical to those of overhead door shade system **100** (as described in FIGS. 1-9). Preferably, a series of fabric grommet(s) **202** of a typical type are installed on the upper edge

158 of the screen panel **106**, as shown. Each of the grommets **202** receives a fastener, such as a screw or bolt, to attach the upper edge **158** of screen panel **106** to the bottom panel **124** of the overhead door **102**, as shown. Upon reading the teachings of this specification, those with ordinary skill in the art will understand that, under appropriate circumstances, considering such issues as user preference, marketability studies, ease-of-use, etc., the overhead door shade system may preferably comprise a bottom weight, such as a hembar, etc.

FIG. 11 is a perspective view, partially in section, of the overhead door shade system **200** of FIG. 10 shown mounted to an overhead door **102**, in a stored position. Preferably, when not in use, the bottom edge **206** of screen panel **106** is secured to the upper panel **125** of overhead door **102** with a plurality of elastic cords **204** (embodying herein at least one securer structured and arranged to removably secure at least one portion of such at least one blocker to at least one interior portion of the at least one overhead-type access door, wherein such at least one securer comprises at least one elastic cord having at least one hook), as shown. Preferably, a series of fabric loops **205** (or less preferably, grommets **202**) are installed along the bottom edge **206** (in this example the term bottom edge refers to the "in service" position of overhead door shade system **200**) of screen

panel **106** to provide attachment points for elastic cords **204**, as shown. Preferably, when the attached elastic cords **204** are drawn over and fixed to upper panel **125**, overhead door shade system **200** is drawn closely adjacent to the interior face **108** of overhead door **102**, as shown. Upon reading the teachings of this specification, those with ordinary skill in the art will now understand that, under appropriate circumstances, considering such issues as design and manufacturing requirements, cost, availability of materials, marketability studies, etc., other fastening systems to secure the screen panel to the overhead door such as Velcro™, hooks, buttons, zippers, etc., may suffice.

FIG. 12 is a perspective view of overhead door shade system **100** mounted to a rolling overhead door **208**, according to an alternate preferred installation thereby illustrating how the overhead door shade system **100** is suitable for use with a wide range of overhead door types, including rolling and coiling-type overhead doors, as shown. Preferably, the overhead door shade system **100** mounts to the panel **123**, as shown. In an alternate preferred installation, overhead door shade system **100** may mount to the end tracks **120**. Upon reading the teachings of this specification, those skilled in the art will appreciate that considering the use of automatic electric drive motors with various types of transmission and linkage elements, including gear and screw drives, are well-known in the art, other raising

and lowering mechanisms, such as electromechanical, hydraulic, and pneumatic mechanisms, including manual cranking mechanisms of all types (including any combination of the above-noted elements), etc., may suffice.

Although applicant has described applicant's preferred embodiments of this invention, it will be understood that the broadest scope of this invention includes such modifications as diverse shapes and sizes and materials. Such scope is limited only by the below claims as read in connection with the above specification.

Further, many other advantages of applicant's invention will be apparent to those skilled in the art from the above descriptions and the below claims.